

# Juice

In 1940, children didn't run into the kitchen demanding a glass of juice. Chocolate milk, maybe, or soda pop, or even a glass of water, but not fruit juice. The beverage choices in 1941 were strictly limited. "Convenience" juices were canned or bottled, and their flavor typically bore only a superficial resemblance to the fresh article. Today, of course, a variety of juices with fresh fruit flavor pack the shelves and freezer bins in supermarkets.

While the postwar invention in Florida of frozen concentrated orange juice has been the celebrated commercial success in the juice line, research to create fruit essences began in the Eastern lab as early as 1943. First developed for apple juice, the process eventually proved capable of capturing most of the flavor of noncitrus juices.

It worked like this: Freshly pressed apple juice passed through an evaporator that vaporized the volatile flavors so quickly that little or no flavor change took place. The vapor containing the apple flavor, which amounted to from 10 to 20 percent of the juice, was then concentrated to about 1 percent of its original volume. This fruit essence could then be added back to the rest of the juice, which meanwhile had been transformed into syrup or concentrate, or used separately as a flavoring agent.

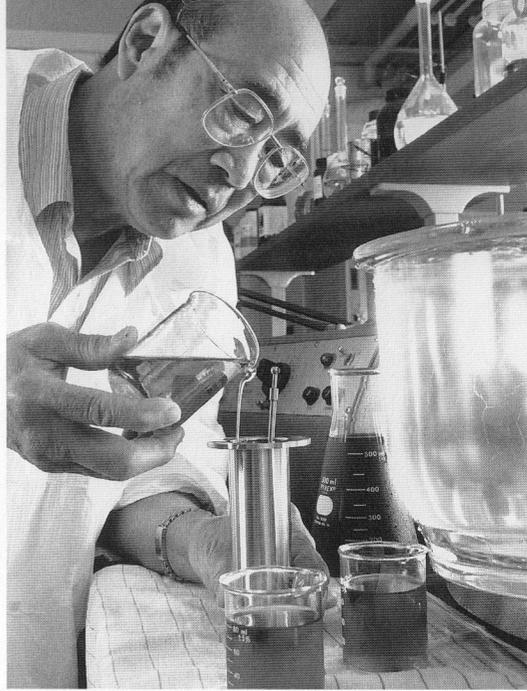
During the next few years, more than a score of firms applied the ERRC research, supplying fruit essences for jellies and preserves, candies, pancake syrups, flavoring extract, dairy drinks, and ice cream. A pint of fruit essence could flavor 100 pounds of preserves. This concentration of flavor and aroma made it possible to transport the essences cheaply over long distances and provided growers with a year-round market for many seasonal fruits.

Subsequent application of the research by ERRC scientists led to concentrated frozen apple juice and grape juice. Both products were developed at the Eastern lab; both returned the flavor essences to the juice after it was concentrated. An apple essence



*In 1943, Clara Day of the Eastern lab pours a sample of concentrated apple syrup, one result of early research to capture full-flavor juice concentrates. The work led to development of frozen concentrated apple and grape juice.*

*Food technologist Kent C. Ng of WRRC prepares to test a new clear apricot juice. It is made by treating pulpy apricot concentrate with enzymes and then passing the mixture through ceramic filters.*



made from peels and cores was also added to canned applesauce to fortify its flavor.

A way was also found to preserve apple cider, which normally has a short shelf life because it ferments so quickly into “hard” cider. Potassium sorbate was added to control yeast and mold formation, and refrigeration at 50°F was recommended to control bacterial growth. Ultraviolet light treatment was also used to prevent spoilage. Taken together, the practices extended the life of cider from a few days to several weeks. Cider makers using the preservative reported sharply increased sales.

Meanwhile, other regional labs were pursuing their own juice research. In the West, scientists located the cause of occasional gelling in orange juice concentrate. New processing equipment was squeezing more pectin and pectin enzymes from the orange peel into the juice. All too often, the enzymes would cause the juice to gel, and once gelled, the concentrate couldn’t be reconstituted. A WRRC team found a way to inactivate the enzymes with steam injection heating and kept the industry from having to junk its new equipment.

Other juice innovations at the Western lab include:

- Methods for controlling heat-resistant molds in processed grape, pineapple, and other juices.
- A flash-heating system capable of sterilizing, concentrating, and cooling fluid foods in 1 second.
- A continuous method for making jelly with fruit juice concentrates that turns out a better product at less cost.
- Puff-dried citrus juice that can be readily reconstituted with water. Stable and lightweight, it’s a boon to the military, campers, and backpackers.
- A sparkling clear frozen strawberry-juice concentrate for jellies and sherbet that uses berries too small or misshapen to make the grade in the fresh berry market.
- Prune juice produced by a continuous 30-minute process that uses an enzyme to break down pectin. A research bonus, the juice lacks the caramelized taste of old-style prune juice.
- A way to control the viscosity, or consistency, of tomato juice and other liquid tomato products by adjusting the acidity when tomatoes are crushed.
- An automated system for extracting juice from apples.
- The discovery that small wineries can freeze crushed grapes at harvest and hold them until their limited fermentation facilities become available.
- And very recently, a technique for making clear apricot juice using enzymes and ceramic filters.

At the Southern lab, whose scientists helped create frozen orange juice, researchers later developed superconcentrates of unsweetened lime juice. They also worked with the Georgia Agricultural Experiment Station to develop new peach products, including a clear peach-juice concentrate.